Overview of the Diruon Risk Assessment

July 29, 2002

Introduction

This document summarizes the Environmental Protection Agency's (EPA) human health, environmental fate and transport, and ecological risk findings for the pesticide diuron, as presented fully in the documents, "Diuron: HED Risk Assessment for the Reregistration Eligibility Decision (RED) Document," dated March 13, 2002, and "Environmental Risk Assessment for the Reregistration of Diuron," dated March 11, 2002. The purpose of this overview is to help the reader understand the conclusions reached in the risk assessments by identifying the key features and findings of the assessments. References to relevant sections in the complete documents are provided for a more detailed explanation. This overview was developed in response to comments from the public which indicated that EPA's risk assessments were difficult to understand, that they were too lengthy, and that it was not easy to compare the assessments for different chemicals due to the use of different formats.

These diuron risk assessments and additional supporting documents, are posted on EPA's Internet website (http://www.epa.gov/pesticides/reregistration/diuron) and are available in the Pesticide Docket for public viewing. Meetings with stakeholders (i.e., growers, extension officials, public interest groups, commodity group representatives and other government officials) will be held to discuss the risk assessments, the identified risks and solicit input on risk mitigation strategies, if needed. This feedback will be used to complete the Reregistration Eligibility Decision (RED) document, which will include the resulting risk management decisions. The Agency plans to conduct a close-out conference call with interested stakeholders to describe the regulatory decisions presented in the RED. In the case of diuron, the Agency intends to proceed with finalizing the tolerance reassessment now and completing the RED, including any necessary mitigation for worker and ecological risks in 2003.

Risks summarized in this document are those that result only from the use of diuron. The Food Quality Protection Act (FQPA) requires that the Agency consider "available information" concerning the cumulative effects of a particular pesticide's residues and "other substances that have a common mechanism of toxicity." The reason for consideration of other substances is due to the possibility that low-level exposures to multiple chemical substances that cause a common toxic effect by a common mechanism could lead to the same adverse health effect as would a higher level of exposure to any of the other substances individually. The Agency did not perform a cumulative risk assessment as part of this reregistration review of diuron because the Agency has not yet determined if there are any other chemical substances that share a common mechanism of toxicity with diuron (see Section 6 of the Human Health Risk Assessment, dated March 13, 2002). For purposes of this risk assessment, EPA

has assumed that diuron does not have a common mechanism of toxicity with other substances.

Available data indicate that 3,4-DCA is a metabolite of linuron, diuron, and propanil. EPA has not aggregated residues of 3,4-DCA for the linuron, diuron and propanil risk assessments because neither linuron nor diuron metabolize to 3,4-DCA in appreciable amounts (less than 1% of the parent compound for diuron) in animal, plant and environmental (soil and water) metabolism studies. Therefore, 3,4-DCA is a significant residue of concern for propanil, it is not a residue of concern *per se* for linuron or diuron. The registered uses for linuron, diuron, and propanil result in minimal co-occurrence of use. That is, there is very little overlap of use patterns and the use patterns are geographically limited for each active chemical. Therefore, the risk assessments for each individual chemical fully assess the risks posed by the parent compound and the relevant metabolites.

In the future, the registrant may be asked to submit, upon EPA's request and according to a schedule determined by the Agency, such information as the Agency directs to be submitted in order to evaluate issues related to whether diuron shares a common mechanism of toxicity with any other substance and, if so, whether any tolerances for diuron need to be modified or revoked. If the Agency identifies other substances that share a common mechanism of toxicity with diuron, we will perform aggregate exposure assessments on each chemical, and will begin to conduct a cumulative risk assessment. The Agency has developed a framework for conducting cumulative risk assessments on substances that have a common mechanism of toxicity. This guidance was issued on January 16, 2002 (67 FR 2210-2214), and is available from the OPP Website at: http://www.epa.gov/pesticides/trac/science/cumulative_guidance.pdf.

The risk assessment, and documents pertaining to the Agency's report on FQPA tolerance reassessment progress and risk management decision for diuron are available on the Internet at http://www.epa.gov/pesticides/reregistration/status.htm and the public docket for viewing. Because the dietary risks posed by the use of diuron are low and drinking water concerns are being addressed by mitigation and the development of confirmatory data, the Agency is proceeding with its decision on the tolerance reassessment at this time. The Agency's tolerance reassessment decision for diuron will be announced in the Federal Register. The complete RED for diuron will be issued later this year.

Use Profile

- **Herbicide, Mildewcide and Algaecide:** Registered for pre- and post-emergent herbicide treatment of both crop and non-crop areas, as a mildewcide and preservative in paints and stains, and as an algaecide in commercial fish production, residential ponds and aquariums.

- **Formulations:** Formulated as wettable powder (25% to 80% ai), liquid (up to 40% ai), emulsifiable concentrate (2% to 80% ai), dry flowable (40% to 80 % ai), flowable concentrate (19% to 47.5% ai), granular (0.2% to 20% ai), pellet/tablet (0.51% to 19% ai), and ready-to-

use solution (0.67% to 19% ai).

- **Methods of Application:** Applied by groundboom sprayer, aerial equipment, chemigation, right-of-way sprayer, high- and low-pressure handwands, tractor-drawn spreader, push-type spreader, airless paint sprayer, paintbrush, paintbrush/roller, shaker-type applicator, backpack sprayer, backpack granular spreader, belly grinder, spoon, or hand.

- **Use Rates**: For agricultural uses, labeled single application rates range from 0.2 to 9.6 lbs active ingredient (ai) per acre. One to four applications per season may be applied in 60-day intervals, for most crops only one application is used. For non-agricultural uses labeled rates range from 0.8 lbs to 87 lbs ai/acre; however, the highest application rate on an actively marketed label is 12 lbs ai/acre. The risk assessments evaluate a range of rates; however, this overview will focus on application rates of 12 lbs ai/A or lower. The higher rates on the other products are not being supported by the registrant and will be removed from product labels. Diuron may be applied to non-agricultural areas 1 to 2 times per year. For the mildewcide and preservative in paint uses, label rates go up to 0.053 lbs ai/gal. and for algaecidal uses labeled rates are less than 1/100th % ai/gal.

- **Annual Poundage:** Estimates for total annual domestic use average approximately nine to ten million pounds of active ingredient. Approximately two thirds are used on agricultural crops and the remaining one third on non-crop areas. Diuron is used on 33 crops. Crops with the highest percent crop treated are the citrus fruit group, dried citrus pulp, blackberries, blueberries, boysenberries, currants, dewberries, gooseberries, huckleberries, loganberries, raspberries, pineapple, and asparagus. In terms of pounds applied, oranges and cotton account for the greatest agricultural use. Right-of-way applications (e.g., the area around railroad tracks) are the greatest non-agricultural use of diuron, with approximately 2 to 3 million pounds applied annually.

- **Registrants:** Griffin Corporation, Drexel, DuPont, Staveley, United Phosphorus, and Makhteshim-Agan of North America

Human Health Risk Assessment

Dietary

Diuron is an herbicide that is not applied directly to most agricultural crops, but is applied to the area around the crop to kill weeds. However, the following crops can be treated with foliar applications of diuron: oats; forage; oats, grain; oats, hay; oats, straw; wheat, forage; wheat, grain; wheat, hay; wheat straw; birdsfoot trefoil, forage; birdsfoot trefoil, hay; grass, forage, except Bermuda grass; grass, hay, except Bermuda grass; alfalfa, forage; alfalfa, hay; asparagus; clover, forage; clover, hay; pineapple; and sugarcane. The residue data for diuron, which does not indicate dietary concerns, is consistent with this use pattern.

Acute Dietary Risk (Food)

For a complete discussion, see section 4.2 of the "Diuron: HED Risk Assessment for the Reregistration Eligibility Decision (RED) Document," dated March 13, 2002.

Acute dietary risk is calculated considering foods eaten in one day (consumption) and diuron residue values in or on the food eaten by the general population and each population subgroup of interest. The consumption distribution can either be multiplied by a residue point estimate for a deterministic-type (i.e., Tier I/II) exposure assessment, or used with a residue distribution in a Tier III probabilistic-type (Monte Carlo) exposure assessment. A risk estimate that is less than 100% of the acute Population Adjusted Dose (aPAD) (the dose at which an individual could be exposed on any given day that would not be expected to result in adverse health effects) does not exceed the Agency's level of concern. The aPAD is the acute reference dose (aRFD) adjusted for the FQPA safety factor.

The Agency has not performed an acute dietary risk assessment of diuron because no adverse effects attributed to a single exposure were identified in any available study.

Chronic (non-cancer) Dietary Risk (Food)

For a complete discussion, see section 4.2 of the "Diuron: HED Risk Assessment for the Reregistration Eligibility Decision (RED) Document," dated March 13, 2002.

Chronic dietary risk is calculated by using an average consumption value (based on a survey) for food and average residue values on those foods consumed over a 70-year lifetime. A risk estimate that is less than 100% of the chronic PAD (the dose at which an individual could be exposed over the course of a lifetime and no adverse health effects would be expected) does not exceed the Agency's level of concern. The cPAD is the chronic reference dose (cRfD) adjusted for the FQPA Safety Factor.

Chronic risk estimates from exposures to food do not exceed the Agency's level of concern. The chronic risk estimate for food is about 3% of the cPAD for the U.S. Population and about 7% for children from 1-6 years, the most sensitive population subgroup.

- The toxicity endpoint for the chronic dietary assessment is from a combined chronic/carcinogenicity study in rats. It is based on evidence of hemolytic anemia (an effect that reduces the oxygen carrying capacity of the blood cells) and compensatory hematopoiesis (regeneration of red blood cells). A No Observable Adverse Effect Level (NOAEL) was not established and these effects were observed at 1.0 mg/kg/day (Lowest Observable Adverse Effect Level or LOAEL).

- The Uncertainty Factor (UF) is 300X: 10X for inter-species variation, 10X for intra-species extrapolation, and 3X for the lack of a NOAEL.

- There is an acceptable developmental toxicity study in rabbits and an acceptable two-generation reproduction study in rats. A developmental toxicity study in rats was classified as unacceptable due to deficiencies in analytical data on the sample analysis. However, the Hazard Identification Assessment Review Committee (HIARC) considered the developmental toxicity study in rats adequate for the FQPA susceptibility assessment based on the observation that the developmental toxicity NOAEL was higher than the maternal NOAEL.

- There are no neurotoxic signs in any of the submitted subchronic or chronic studies and a literature search did not reveal any studies relevant for assessing the potential neurotoxicity of diuron.

- The 10X FQPA Special Safety Factor is reduced to 1X (i.e., removed) because there is no indication of increased susceptibility of rats or rabbits to *in utero* or postnatal exposure, and the dietary and non-dietary assessments are not likely to underestimate potential exposure to infants and children. A developmental neurotoxicity study (DNT) with diuron is not required.

- The chronic Population Adjusted Dose (cPAD) is 0.003 mg/kg/day and is equal to the LOAEL (1.0 mg/kg/day) divided by the uncertainty factor (UF) of 300X.

- Anticipated residues from field trial data were utilized to estimate dietary exposure. The field trials were conducted at the highest application rates allowed for the crop tested; therefore, the residues from these trials are considered high end. Available processing data for apples, citrus, grapes and sugarcane refined into sugar and molasses were used in the assessment. In addition, averaged percent crop treated information was included in the assessment.

- USDA Pesticide Data Program (PDP) food monitoring data are available for diuron (parent

compound) only. These data indicate no detectable residues of the parent compound in any of the foods sampled, PDP data were not used in the dietary assessment because metabolites were not monitored.

Cancer Dietary Risk (Food)

For a complete discussion, see section 4.2 of the "Diuron: HED Risk Assessment for the Reregistration Eligibility Decision (RED) Document," dated March 13, 2002.

Like chronic dietary risk, potential dietary cancer risk is calculated by using the average consumption values for food and average residue values for those foods over a 70-year lifetime. The chronic exposure value is typically combined with a linear low-dose (Q_1*) approach to determine the lifetime (cancer) risk estimate. The Agency generally considers risks lower than 1×10^{-6} (i.e., probability less than one in one million) to be of potential concern for dietary cancer exposure.

- Two separate cancer risk assessments were completed for diuron and MCPDMU (N'-(3-chlorophenyl)-N,N-dimethyl urea), a degradate of diuron in water. Because the cancer effects (i.e., target organs) for the two compounds differ, the risks from diuron and MCPDMU are not combined.

- Diuron is classified as "known/likely human carcinogen" (See *Carcinogenicity Peer Review of Diuron*, 5/8/97). Carcinogenicity studies in the rat showed urinary bladder carcinoma in both sexes of Wistar rat, and kidney carcinomas in the male rat (a rare tumor). Mammary gland carcinomas were observed in the female mouse.

- Based on a Q_1* of 1.91×10^{-2} $(mg/kg/day)^{-1}$, the potential dietary cancer risk estimate for diuron is 1.68×10^{-6} $(mg/kg/day)^{-1}$.

- The estimated cancer dietary risk associated with the use of diuron indicates a borderline exceedance above 1×10^{-6} and shows a lifetime risk estimate of 1.68×10^{-6} for the general population. The Agency does not believe potential dietary cancer risk to be of concern because the residues used in the calculations are from field trials conducted at the highest application rates and some processing data are still outstanding. Therefore, the exposure calculation is a conservative estimate.

- Information provided by the registrant related to the cancer mechanism of action was insufficient to support reclassification of the cancer category for diuron at this time. The information suggested the reversibility of possible precancerosis but did not present or propose a mode of action for bladder tumors from diuron exposure. The Agency agrees that there is little or no concern for mutagenic activity of diuron (See the Agency HIARC report, dated August 28, 2001).

- Based on a Q_1* of a similar compound, monuron, the estimated dietary risk for MCPDMU is 1.02×10^{-7}, which includes catfish consumption only. The anticipated residue of MCPDMU in catfish was calculated using the 2 ppm tolerance for catfish, the fraction of applied radioactive diuron converted to MCPDMU in an aerobic aquatic metabolism study (see the Environmental Risk Assessment) and the percent crop treated for catfish.

- Based upon environmental laboratory studies, it is known that in drinking water only, diuron partially degrades to another chemical referred to as MCPDMU (N'-(3-chlorophenyl)-N,N-dimethyl urea). However, the environmental fate and persistence of MCPDMU are uncertain. MCPDMU is structurally similar to monuron [N'-(4-chlorophenyl)-N,N-dimethyl urea]. Monuron produces tumors in the kidney and liver in male rats and has a Q_1* of 1.52×10^{-2}. Due to the structural similarity between MCPDMU and monuron, the Agency believes it is prudent to evaluate the carcinogenic risk associated with MCPDMU based upon the hazard information concerning the chemical monuron. The Agency believes MCPDMU is likely less toxic than monuron, but is unable to quantify this difference without further information. The approach used in this assessment yields a high-end estimate. Absent information specifically about the carcinorgenic potential of MCPDMU, the Agency has taken this conservative, health protective approach in its assessment. The Agency is addressing this uncertainty by requiring additional information about the behavior and fate of diuron and its drinking water degradates. This exposure information will permit refinement of the drinking water assessment.

Drinking Water Dietary Risk

For a complete discussion, see section 4.3 of the "Diuron: HED Risk Assessment for the Reregistration Eligibility Decision (RED) Document," dated March 13, 2002.

Drinking water exposure to pesticides can occur through ground water and surface water contamination. EPA considers both acute (one day) and chronic (lifetime) drinking water risks and uses either modeling or actual monitoring data, if available, to estimate those risks. To determine the maximum allowable contribution of pesticide residue in water allowed in the diet, EPA first looks at how much of the overall allowable risk is contributed by food, then calculates a drinking water level of comparison (DWLOC) to determine whether modeled or monitoring levels exceed this level.

The DWLOCs represent the maximum contribution to the human diet (in ppb or µg/L) that may be attributed to residues of a pesticide in drinking water after dietary exposure is subtracted from the aPAD or cPAD. Risks from drinking water are assessed by comparing the DWLOCs to the estimated environmental concentrations (EECs) in surface water and ground water. Drinking water modeling is considered to be an unrefined assessment and provides conservative estimates based on maximum labeled rates and number of applications.

In this case, only chronic (non-cancer) and cancer drinking water risks have been assessed since no acute endpoint was identified and there are no acute risks of concern.

- Estimated drinking water concentrations for ground water are based on the SCI-GROW model, which is a Tier I assessment that provides a conservative estimate. The modeled estimates indicate that ground water concentrations of diuron and its metabolites are below the chronic DWLOC.

- For surface water, the following Tier II screening models PRZM and EXAMS were run using: the maximum labeled rates for citrus (6.4 lb ai/A); the Index Reservoir; and, the Percent Crop Area (PCA) adjustment (to determine estimated surface water concentrations of diuron and its degradates). The drinking water assessment is based on using the maximum rates on citrus crops in Florida because this scenario is anticipated to represent the highest potential drinking water concern.

- The index reservoir model represents a vulnerable drinking water source from a specific area with specific cropping patterns, weather, soils, and other factors. The PCA is a generic watershed-based adjustment factor which represents the portion of a watershed planted with a crop or crops. The model indicates that diuron and its degradates have the potential to contaminate surface water by runoff in areas with large amounts of annual rainfall.

- Drinking water derived from surface water is not of concern except for chronic risk in the flatwood area of Florida at the maximum application rate. In this area, the EECs at the maximum application rate of 6.4 lbs ai/A (9.6 lbs ai/A per year) are 42 ppb, with a DWLOC of 28 ppb. The registrant for diuron has provided a Geographic Information System watershed analysis that may allow for refinement of the modeling estimates for this area. Residue data to support the 9.6 lbs ai/A per year rate are required. The registrant may provide data to support this use rate or change the labels to reflect the use rate of 6.4 lbs ai/A per year, as supported by current residue data.

- For other areas of Florida where the citrus application rate is 3.2 lbs ai/A (up to two applications per year) the EECs are 30 ppb, with a DWLOC of 28 ppb for the most sensitive subpopulation, children 1-6. This represents a slight exceedance and, given the protective assumptions in the dietary assessment, does not pose a risk of concern. It should be noted that the original risk assessment used the maximum yearly rate for citrus (9.6 lbs ai/A) to calculate the EECs instead of the maximum single application rate of 6.4 lbs ai/A for citrus. The information presented in this overview is based on the 6.4 lbs ai/A rate.

- For diuron potential cancer risk, no DWLOC has been calculated. Food alone shows a slight exceedance for cancer risk (1.68×10^{-6}) based on field trial data using maximum application rates. These estimates can be refined with additional processing data and monitoring data. To better characterize both potential cancer risks from surface water, EPA has evaluated monitoring data from Florida, an area of high diuron use. These data indicate detections

generally one to two orders of magnitude lower than modeled estimates for diuron (parent compound). The monitoring data for Florida can be found on the following website: www.sfwmd.gov/curre/pest/pestindex.htm.

- For the degradate MCPDMU, the EEC for surface water using PRZM/EXAMS is 5 ppb, and exceeds the calculated DWLOC of 2.0 ppb, based on the 3.2 lbs ai/A rate for citrus. The drinking water assessment for MCPDMU can be refined with additional environmental fate data. These data are required.

- Additional monitoring data on diuron and its degradates evaluated for this assessment are listed below.
  - A study on the occurrence of cotton herbicides and insecticides in the Playa Lakes area of the high plains of western Texas was evaluated. Diuron and metabolites were found in 71% of the samples collected from 32 lakes at a mean concentration of 2.7 ppb. This study did not have sufficient frequency of sampling or a long enough sampling period to be used for regulatory purposes. In addition, the study has limited use in a National assessment because western Texas is not expected to be one of the most vulnerable use areas for runoff, the method of contamination expected with diuron. However, because samples were taken within 2 days of application, the results provide an indication of concentrations that could occur in drinking water in that area.

  - The US Geological Survey National Water Quality Assessment Program (NAWQA) collected 1420 surface water samples from 62 agricultural stream sites during a 6 year period from 1992 - 1998. Diuron was detected in 7.32% of the samples at a mean concentration of 0.13 ppb.

Residential Risk

For a complete discussion, see section 4.4 of the "Diuron: HED Risk Assessment for the Reregistration Eligibility Decision (RED) Document," dated March 13, 2002.

There are two potential sources of exposure to diuron in a residential setting - as an algaecide in ponds and aquariums, and as a preservative or a mildewcide in paints. Exposure from the dermal and inhalation routes are combined for each residential use.

- The algaecide products are formulated as tablets/blocks and as a liquid. There are no exposure data for the use of the algaecide tablets/blocks. Since the products are formulated as tablets/blocks and dissolve in less than 5 minutes, minimal exposure is expected and was not quantified. The liquid is used at a rate of one teaspoon (5 ml) for every 10 gallons of aquarium or pond water, once a month or when algae growth reappears. Residential exposure may

result from measuring the liquid and pouring the liquid into the aquarium or pond. Exposure is expected to be short-term (1 to 30 days). These risks are not of concern.

- Residential painters using paints and stains were assumed to use airless sprayers and paint brushes. Exposure is expected to be short-term (1 to 30 days). For homeowners, the airless sprayer is assumed to be used for outdoor applications only. For indoor applications, EPA assumed that painting would be restricted to small rooms such as bathrooms (high potential for moisture) where an airless sprayer is unlikely to be used. These risks are not of concern.

The only potential residential exposure scenario of concern is due to the cancer risk to applicators using diuron treated paints or stains applied with airless paint sprayer or paint brush. Depending on the exposure data used, application method employed and the amount applied, calculated risk to applicators range from 3×10^{-10} to 3.4×10^{-6} over a lifetime of 70 years.

Similar to dietary cancer risk, potential residential cancer risk is calculated by using the average exposure over a 70-year lifetime. The lifetime exposure value is typically combined with a linear low-dose (Q_1*) approach to determine the lifetime (cancer) risk estimate. The Agency generally considers risks lower than 1×10^{-6} (i.e., greater than one in one million) to exceed its level of concern for potential residential cancer risk.

- The applicator assessment for paints and stains applied with a brush or an airless sprayer is based on a Q_1* of 1.91×10^{-2} $(mg/kg/day)^{-1}$, and an application rate of 0.053 lb ai per gallon. This is the maximum application rate. For a cancer risk assessment, typical rates would ordinarily be used but these were not available. The assessment also assumes two gallons for paints to five gallons for stains applied with a brush per day or fifteen gallons applied per day with an airless sprayer, 2 applications per year, 50 years of use over a 70 year lifetime, and a high-end dermal absorption factor of 4% calculated from submitted studies. Usage information gathered subsequent to the risk assessment indicates that less than 5% of all paint contains diuron. Therefore, it is unlikely that a homeowner would only apply paint containing diuron two times per year for 50 years.

Postapplication Risk

Diuron is applied to ponds/aquariums in the form of a liquid or an effervescent tablet. Due to the high dilution rate of the liquid in pond and aquarium water (0.0000074 lb ai per gallon of water), and the effervescent nature of the tablet (expected to dissolve in less than five minutes), postapplication exposure to diuron in pond and aquarium water is expected to be minimal. Furthermore, postapplication activities in and around ponds/aquariums treated with diuron are assumed to be infrequent.

Postapplication inhalation and dermal exposure resulting from the indoor use of diuron in paints is also expected to be minimal. The Agency has conducted a screening-level inhalation assessment

using the Multi-Chamber Concentration and Exposure Model (MCCEM). The MCCEM uses air infiltration and interzonal air flow rates, together with user inputs for emission rates, decay rates, and outdoor concentrations to calculate time-varying indoor concentrations and associated indoor inhalation exposure due to product or material emissions in several zones or chambers within a residence. The result of this model, coupled with diuron's low vapor pressure (2×10^{-7} mm Hg at 30 EC), shows minimal postapplication inhalation exposure is likely. Furthermore, diuron-treated paint is most likely to be used in rooms where high humidity is expected (e.g., a bathroom), and would rarely be used in the entire house. It is unlikely that a homeowner would receive a significant amount of postapplication inhalation exposure from diuron-treated paint, as the very nature of its use is as a mildewcide, and any substantial loss of the active ingredient from the paint would render the product ineffective.

Aggregate Risk

For a complete discussion, see section 5.0 of the "Diuron: HED Risk Assessment for the Reregistration Eligibility Decision (RED) Document," dated March 13, 2002.

The aggregate risk assessment for diuron examines the combined risk from exposure through food, drinking water and residential use.

- There are no adverse effects expected from a single exposure to diuron; therefore, an acute risk assessment was not conducted. Short-term aggregate risks from food, residential inhalation, and drinking water are not of concern.

- Estimated aggregate chronic risk (noncancer) concentrations of diuron and its metabolites in surface water slightly exceed the chronic DWLOC in the Flatwood area of Florida. Because field trial residue levels (from maximum labeled rates) were used in the assessments, dietary risks are high end estimates and may be refined further.

- An aggregate cancer estimate has not been calculated since conservative assumptions were used in both the dietary and drinking water assessments. Thus, aggregation of these assessments would result in an even more conservative expression of risk.

- Dietary risk estimates can be further refined with processing data and monitoring data that accounts for diuron and its metabolites.

- Additional targeted drinking water monitoring will be required to fully characterize drinking water risk of diuron and its metabolites.

- Because of the low percent of paint containing diuron, exposure to home applicators is not likely to be a significant contributor to aggregate risk.

- Calculated diuron potential cancer risks from food and residential applicator exposure (paints

and stains) show a slight exceedance of the Agency's level of concern, 1×10^{-6}. As noted previously, both assessments include conservative exposure assumptions. In both cases additional data will allow for refinement of the exposure portion of the assessment.

- As discussed above (under Drinking Water Dietary Risk), diuron degrades in water to MCPDMU. Because no toxicology data are available for MCPDMU, the Agency used data from a structurally similar compound, monuron, to assess the potential cancer risk from MCPDMU. Based on the algaecidal use in commercial fish ponds, the dietary cancer risk from catfish alone is 1.02×10^{-7} and is not of concern.

- For surface water contamination from the degradate MCPDMU, crop and non-crop uses are potentially of concern based on tier II modeling EEC estimate of 5 ppb exceeding the DWLOC of 2.0 ppb, based on a 3.2 lbs ai/A (up to two applications per year). For the Flatwood area in Florida, where the maximum application rate of 6.4 lbs ai/A (9.6 lbs ai/A per year) is used, the EEC is 8 ppb, exceeding the DWLOC of 2.0 ppb. These estimates can be refined with additional environmental fate data on the metabolite and/or monitoring data. Residue data to support the 9.6 lbs ai/A per year rate are required. The registrant may provide data to support this use rate or change the labels to reflect the use rate of 6.4 lbs ai/A per year, as supported by current residue data.

Occupational Risk

For a complete discussion, see section 7.0 of the "Diuron: HED Risk Assessment for the Reregistration Eligibility Decision (RED) Document," dated March 13, 2002.

People can be exposed to a pesticide while working through mixing, loading, or applying a pesticide, and reentering a treated site. Handler and worker risks (non-cancer) are measured by a Margin of Exposure (MOE) which determines how close the occupational exposure comes to a No Observed Adverse Effect Level (NOAEL) taken from animal studies. Generally, MOEs greater than 100 are not of concern. Potential cancer risks are measured in terms of the increased chance that an effect would occur over the course of a life-time.

In the case of diuron, dermal and inhalation risks for handlers are assessed. Handler exposures to diuron are expected to be short-, intermediate- and long-term. However, no dermal endpoints were identified for short- and intermediate-term exposures. Potential life-time cancer risk is also calculated for the various handler scenarios. The assessment also includes risks to postapplication workers who enter treated areas to perform certain agricultural activities, such as harvesting.

Occupational Handler Summary

EPA identified 31 handler exposure scenarios resulting from mixing/loading and applying (liquid and dry) diuron for crop and non-crop areas, based on diuron's labeled use directions. The assessment evaluated mixing, loading, and applying liquid, dry flowable, wettable powder, and granular formulations with aircraft, groundboom sprayer, chemigation, high and low pressure handwands, tractor drawn spreader, push-type spreader, gravity feed spreader, pump feed spreader, and belly grinder. In addition, two scenarios are assessed for those mixing and loading diuron in the manufacture of paints and stains (primary handlers), two scenarios for commercial painters (secondary handlers), and four scenarios for mixing and loading diuron algaecides for commercial fish ponds.

- Handler exposures to diuron are expected to be mainly of short-term duration (one day to one month). Intermediate-term exposure (one month to several months) for handlers is possible for large field crops, including corn, wheat, oats and cotton, because of their long planting seasons. Right-of-way sprayer scenarios for utility and industrial areas are assumed to be of intermediate-term duration, because utility workers could possibly treat right-of-way areas (roadsides, railroads, etc) all summer long. However, for most uses diuron is only applied one to two times per season.

- Of the 31 handler exposure scenarios, all short- and intermediate-term exposure scenarios resulted in MOEs at or near the target of 100 with PPE and engineering controls, as appropriate.

- No systemic toxicity following repeated dermal dosing at 1200 mg/kg/day was seen in the rabbit dermal toxicity study; therefore, a quantitative non-cancer dermal risk assessment (short- and intermediate-term) is not required.

- For the long-term dermal toxicity endpoint, a LOAEL of 1.0 mg/kg/day is based on evidence of hemolytic anemia (an effect that reduces the oxygen carrying capacity of the blood cells) and compensatory hematopoiesis (regeneration of red blood cells) from the chronic toxicity/carcinogenicity study in the rat. Because a NOAEL was not established, an additional 3x uncertainty factor is included resulting in a 300x UF.

- For estimating dermal risks in the cancer assessment, EPA uses oral animal studies in the absence of appropriate dermal toxicity studies and adjusts for the amount of pesticide absorbed through the skin. For diuron, no dermal absorption study is available. However, there is a 21-day dermal toxicity study in the rabbit and an oral developmental toxicity study in the rabbit. An upper-bound estimation of dermal absorption of 4% was extrapolated using the maternal LOAEL of 50 mg/kg/day from the oral developmental toxicity study in the rabbit and the NOAEL of 1200 mg/kg/day (HDT) from the 21-day dermal toxicity study in the rabbit: the ratio is 50/1200 or 4%.

- For estimating short-, intermediate-, and long-term inhalation risks, EPA uses oral animal studies in the absence of appropriate inhalation toxicity studies. EPA assumes 100% of the inhaled diuron dose is absorbed by the body.

- For the short-term inhalation toxicity endpoint, a NOAEL of 10 mg/kg/day is based on decreased body weight and food consumption at the maternal LOAEL of 50 mg/kg/day from a developmental toxicity study in the rabbit.

- For the intermediate-term inhalation risk assessment, a NOAEL of 1.0 mg/kg/day is based on altered hematological parameters at the LOAEL of 10 mg/kg/day, observed at 6 months in the chronic toxicity/carcinogenicity study in the rat.

- For the cancer assessment, a linear low-dose approach is used based a Q_1* of 1.91×10^{-2} $(mg/kg/day)^{-1}$ from carcinogenicity studies in rats and mice.

- No diuron-specific exposure studies are available for the occupational assessment. Surrogate-based exposure assessments for each scenario are used from the Pesticide Handler Exposure Database (PHED), the Outdoor Residential Exposure Task Force (ORETF) and other available data.

Handler Risk Scenarios/Assumptions

Handler risk is assessed with a variety of assumptions concerning protection equipment: baseline clothing; minimum personal protective equipment(PPE); maximum PPE; and, when feasible, engineering controls. Baseline assessments assume long pants, long-sleeve shirt, shoes, socks, and for some scenarios chemical resistant gloves. Currently, diuron handlers are required to wear baseline clothing with chemical resistant gloves. Generally, minimum PPE is baseline plus gloves and dust mist respirator and maximum PPE adds coveralls and organic vapor respirator. Engineering controls typically include exposure reducing equipment, such as closed mixing/loading systems, water soluble bags, closed cabs, and closed cockpits.

The results of the non-cancer assessments for crop and non-crop areas indicate that all scenarios are at or near the target MOE with PPE or engineering controls. The diuron cancer risk assessment for crop and non-crop areas indicates five scenarios are of potential concern with calculated risks lower than 1×10^{-4} even with maximum PPE or engineering controls. Primary and secondary handler estimates to diuron in paints and stains, and commercial fish ponds are in the 10^{-5} to 10^{-6} range. Below is a summary of the handler risks of concern.

The following assumptions and factors were used when performing the handler(non-cancer) risk assessment:

- The average body weight of 70 kg is used, representing a typical adult.
- Daily (8-hour work day) acres and volumes to be treated in each scenario include:
  - 350 acres for aerial applications to all agricultural crops;
  - 350 acres for flaggers supporting aerial applications;
  - 80 acres for most groundboom crops, unless otherwise specified;
  - 1,000 gallons for high -pressure hand wands and rights-of-way sprayers;
  - 350 acres for chemigation;
  - 40 gallons for low-pressure handwands and backpack sprayers;
  - 80 acres for tractor-drawn spreader;
  - 5 acres for a push-type spreader and backpack spreader;
  - 1 acre for a belly grinder;
  - 100 square feet for granular hand and spoon application; and
  - 50 gallons for airless sprayer and 5 gallons for paintbrush.

- The duration of exposure for handlers of diuron is assumed to be mostly short-term (one day to one month). Intermediate-term exposure (one month to several months) is possible for large field crops. However most crops only receive one application of diuron per season.

The following assumptions and factors were used when performing the handler cancer risk assessment:

- The average body weight of 70 kg is used, representing a typical adult;
- Exposure duration is assumed to be 35 years. This represents a typical working lifetime;
- Lifetime is assumed to be 70 years;
- Exposure frequencies used in the calculations are, 125 days per year formulating paints, 30 to 180 days per year for painters using an airless sprayer or paint brush; and
- The daily volumes used in the calculations are, 100 to 1,000 gallons of paints treated, 50 gallons for painters using airless sprayers, 5 gallons using a paint brush.

Short-term Worker Assessment for Crop/Non-crop Areas

- All mixer/loader scenarios with wettable powder products are of concern at baseline; the risks estimated in these scenarios can be mitigated with engineering controls.
- Loading and applying is of concern with gravity feed equipment at high rate (87 lbs ai/A) at baseline (MOE=36). This exposure is not of concern at the highest rate currently marketed (12 lbs ai/A).
- Both loading and applying granular products for tractor drawn spreaders are of concern with high rate (87 lbs ai/A). When using the highest rate (12 lbs ai/A) on a currently marketed label, this exposure is not of concern.
- All aerial application scenarios are not of concern provided a closed cockpit is used.
- Applying with high-pressure handwand is of concern with baseline PPE. With maximum PPE,

the MOE is 92.

- Mixer/loader/applicator risk is of concern for low-pressure handwand using baseline PPE. With PPE, this risk is not of concern (83 at min PPE and 170 at max PPE).

Intermediate-term Risks for Crop/Non-crop Areas

- All mixer/loader scenarios with wettable powders are not of concern with engineering controls.
- All aerial application scenarios are not of concern provided a closed cockpit is used.
- Mixing/loading liquids is not of concern with minimum PPE.
- Mixing/loading dry flowable products is of concern at baseline for high acreage crops (1200 A) with a MOE = 34. With minimum PPE this risk is not of concern.
- Applying sprays for right-of-ways with minimum PPE, the MOE=93, but is not of concern.

Cancer Risks for Crop/Non-crop Areas

- Twenty-six scenarios have cancer risks of concern between 1×10^{-4} and 1×10^{-6} with maximum feasible PPE/engineering controls.
- At currently marketed rates, all risks are less than 1×10^{-4} with maximum feasible PPE/engineering controls.

Risks for Occupational Paints

- Intermediate-term risk calculations for indoor painters using airless sprayers result in an MOE of 56.
- Cancer risk for primary handlers in paint manufacturing facilities range from 7×10^{-5} to 2.3×10^{-6}.
- Cancer risk for commercial painters using an airless sprayer range from 9.5×10^{-5} to 2.2×10^{-5}.
- Cancer risk for commercial painters using a brush is 5.8×10^{-5}.

Risks for Commercial Fish Ponds

- No risks of concern (cancer/non-cancer) with use of a closed mixing loading system.

Postapplication Occupational Cancer Risk

EPA has determined that there are potential cancer risks for both private and commercial growers entering treated areas to perform certain agricultural activities after a diuron application. It should be noted that a non-cancer postapplication assessment was not conducted since no systemic toxicity by the dermal route is expected for the short- or intermediate-term durations.

- Only crops that can receive direct foliar treatments were assessed for postapplication risks. These crops are not damaged by foliar treatments of diuron. The crops assessed are oats; forage; oats, grain; oats, hay; oats, straw; wheat, forage; wheat, grain; wheat, hay; wheat straw;

birdsfoot trefoil, forage; birdsfoot trefoil, hay; grass, forage, except Bermuda grass; grass, hay, except Bermuda grass; alfalfa, forage; alfalfa, hay; asparagus; clover, forage; clover, hay; pineapple; and sugarcane.

- The postapplication assessment is based on the current 12-hour restricted entry interval. An assessment was performed using both typical and maximum application rates. For private growers, 10 days of exposure per year is assumed. For commercial growers, 30 days of annual exposure is assumed.

- For field and row crops, medium exposure activities, such as moving irrigation equipment and scouting mature plants are of concern for cancer (private: 1.0×10^{-5}; commercial: 3.0×10^{-5}) at the typical application rate and current 12-hour restricted entry interval (REI).

- For sugarcane, medium exposure activities, such as scouting mature plants are potentially of concern for cancer (private: 6.4×10^{-6}; commercial: 1.9×10^{-5}) at the typical application rate and current 12 hour REI.

- For asparagus and pineapple, all activities assessed are potentially of concern at typical application rates and the 12-hour REI. The estimated risks for private growers performing high, medium, and low exposure activities are 1.1×10^{-5}, 5.4×10^{-6}, and 3.2×10^{-6}, respectively. The estimated risks for commercial growers performing high, medium, and low exposure activities are 3.2×10^{-5}, 1.6×10^{-5}, and 9.7×10^{-6}, respectively. Low exposure activities include moving irrigation pipe, scouting, thinning, and weeding immature plants. Medium exposure activities include moving irrigation pipe and scouting mature plants. High exposure activities include hand harvesting and pruning.

Ecological Risk

For a complete discussion, see the "Environmental Risk Assessment for the Reregistration of Diuron" document, dated March 11, 2002.

To estimate potential ecological risk, EPA integrates the results of exposure and ecotoxicity studies using the quotient method. Risk quotients (RQs) are calculated by dividing exposure estimates by ecotoxicity values, both acute and chronic, for various wildlife species. RQs are then compared to levels of concern (LOCs). Generally, the higher the RQ, the greater the potential risk. Risk characterization provides further information on the likelihood of adverse effects occurring by considering the fate of the chemical in the environment, communities and species potentially at risk, their spatial and temporal distributions and the nature of the effects observed in studies.

Environmental Fate and Transport

- Diuron is persistent and is stable to hydrolysis. Calculated half-lives in aqueous and soil photolysis are 43 and 173 days, respectively. Half lives in laboratory aerobic and anaerobic soil metabolism studies are 372 and 1000 days, respectively. However, in a viable laboratory aquatic system, degradation occurred with half-lives of 33 and 5 days in aerobic and anaerobic systems, respectively. In soil, the half lives of diuron and its degradate DCPMU range from 73 to 139 days and 217 to 1733 days, respectively.

- Diuron has been detected in ground and surface water monitoring. Ground water samples were taken from wells showing detections of diuron with a mean concentration of 2.44 ppb. Surface water samples were taken in a study of pesticides in the Playa Lakes area of the high plains of Texas, from 32 lakes with a mean concentration of 2.7 ppb. The United States Geological Survey (USGS) National Water Quality Assessment Program (NAWQA) program collected 1420 surface water samples from 62 agricultural streams with an average concentration of 0.13ppb. Monitoring data are also available for California and Florida.

Endangered Species

The Endangered Species Act requires Federal agencies to ensure that their actions are not likely to jeopardize listed species or adversely modify designated critical habitat. To analyze the potential of registered pesticide uses to affect any particular species, EPA puts basic toxicity and exposure data into context for individual listed species and their locations by evaluating important ecological parameters, pesticide use information, the geographic relationship between specific pesticides uses and species locations, and biological requirements and behavioral aspects of the particular species. A determination that there is a likelihood of potential impact to a listed species may result in limitations on use of the pesticide, other measures to mitigate any potential impact, or consultations with the Fish and Wildlife Service and/or the National Marine Fisheries Service as necessary. For diuron, EPA has identified potential concerns for some endangered species in California and Florida.

Terrestrial and Aquatic Organism Risk

The impact to non-target terrestrial and aquatic plants is the main ecological concern from the use of diuron, which is consistent with herbicide use. Table 1 compares the range of RQs for terrestrial and aquatic organisms to the level of concern for those organisms.

Table 1: Terrestrial and Aquatic Organism Risk Quotients

Organism	Crop	Range of Application Rate (lbs ai/A)[a]	Level of Concern	Range of RQ Values
Birds (acute)	Cotton, Rights of way	1.6 - 12	0.5	0.01 - 1.66
Mammals (acute)	Rights of way	12	0.5	<0.01 - 0.55
Mammals (chronic)	Cotton, Citrus	1.2 - 4.8	1	0.06 - 9.22
Terrestrial Plants (acute)	Cotton, Rights of way	1.6 - 12	1	1.25 - 77
Aquatic Plants (acute)	Cotton, Rights of way	1.6 - 12	1	9.6 - 171.7
Freshwater fish (acute)	Cotton, Rights of way	1.2 - 12	0.5	0.03 - 0.58
Freshwater Fish (chronic)	Cotton, Rights of way	1.2 - 12	1	0.50 - 9
Estuarine Fish (acute)	Cotton, Sugarcane, Citrus, Rights of way	1.2 - 12	0.5	0.01 - 0.07
Estuarine Fish (chronic)	Cotton, Rights of way	1.2 - 12	1	0.03 - 0.53
Freshwater Invertebrates (acute)	Cotton, Rights of way	1.2 - 12	0.5	0.14 - 2.58
Freshwater Invertebrates (chronic)	Cotton, Rights of way	1.6 - 12	1	0.24 - 1.77
Estuarine Invertebrates (acute)	Cotton, Rights of way	1.2 - 12	0.5	0.023 - 0.412
Estuarine Invertebrates (chronic)	Cotton, Rights of way	1.6 - 12	1	0.17 - 1.31

[a] The assessment is based on one application per season except for the following uses: citrus, 2 applications; cotton, 2 applications; and sugarcane, 3 applications.

Incident Data

There are 29 ecological incident reports for nontarget organisms, reported primarily in the 1990s. Of these incidents, one involved birds, 16 involved fish, and 12 involved plants. Of the 29 incidents, 19 were associated with misuse, three were from a registered use, and seven were not identified as being from a misuse nor a registered use.

Tolerance Reassessment Summary

For a complete discussion, see *Residue Chemistry Chapter For The Diuron Reregistration Eligibility Decision (RED) Document*, dated 7/29/2001.

The Agency has reassessed all 81 existing permanent tolerances for diuron and can make an FQPA safety determination, provided that the registrant revises the product labels consistent with the changes outlined in the Residue Chemistry Chapter and submits the required residue data to support the 9.6 lbs ai/A per year rate for citrus. In addition, two new tolerances are proposed for use on prickly pear (0.05 ppm), and spearmint (1.5 ppm). The Agency has sufficient residue data for reassessing the tolerances for diuron and is requiring additional confirmatory data for alfalfa forage; globe artichokes; barley hay; citrus (9.6 lbs ai/A per year rate), cotton gin byproducts; field corn aspirated grain fractions, forage and stover; sweet corn, stover; sweet corn, forage; filberts; grass forage, hay seed screenings and straw; lemon; pear; oat forage, hay; olive; field pea vines and hay; sorghum aspirated grain, fractions, stover, and forage; and wheat forage and hay. For commodities that require additional residue data, the current tolerance value will continue to be used for enforcement purposes until new data are received. If the new data indicate that adjustments to tolerances are warranted, adjustments will be made at that time. Anticipated residues for all commodities were calculated from field trial data and subsequently utilized to estimate the dietary exposure to diuron. Dietary risks from exposure to diuron do not exceed the Agency's level of concern. Final tolerances for most crops are being proposed as part of this tolerance reassessment. Additional tolerances may be revised once the confirmatory field trial data have been submitted to and reviewed by the Agency. In addition, processing data for field corn and olives and a metabolism study in fish are required.

Table 2: Tolerance Reassessment Summary for Diuron

Commodity	Established Tolerance (ppm)[1]	Reassessed Tolerance (ppm)[2]	Comment *Correct Commodity Definition*
Tolerances Listed Under 40 CFR §180.106(a)			
Alfalfa	2	2/(TBD[3])	[*Alfalfa, forage*]
		2.0	[*Alfalfa, hay*]

Commodity	Established Tolerance (ppm)[1]	Reassessed Tolerance (ppm)[2]	Comment *Correct Commodity Definition*
Apples	1	0.10	The available data indicate that the tolerance should be reduced to 0.10 ppm. [*Apple*]
Artichokes	1	1/(TBD)	[*Artichoke, globe*]
Asparagus	7	7.0	Treatment of asparagus is restricted to early season, prior to the appearance of asparagus spears.
Bananas	0.1	0.05	This tolerance should be reclassified under 180.106(c), as use of diuron on banana will be restricted to HI. The available data indicate that the tolerance should be reduced to 0.05 ppm. [*Banana*]
Barley, grain	1	0.20	These tolerances should be reclassified under 180.106(c), as use of diuron on barley is restricted to western OR and WA. The available data indicate that the tolerance should be reduced to 0.20 ppm for barley, grain; and to 1.5 ppm for barley, straw.
Barley, hay	2	2/(TBD)	
Barley, straw	(2)[6]	1.5	
Birdsfoot trefoil, forage	2	0.10	These tolerances should be reclassified under 180.106(c), as use of diuron on trefoil is restricted to western OR. The available data indicate that the tolerance should be reduced to 0.10 ppm for birdsfoot trefoil, forage and to 0.15 ppm for birdsfoot trefoil, hay.
Birdsfoot trefoil, hay	2	0.15	
Blackberries	1	Reassign; 0.10	The established tolerances for blackberries, blueberries, boysenberries, currants, dewberries, gooseberries, huckleberries, loganberries, and raspberries should be revoked concomitant with the establishment of a tolerance for: The available data indicate that these tolerances should be reduced to 0.10 ppm. [*Berry Group*].
Blueberries	1		
Boysenberries	1		
Currants	1		
Dewberries	1		
Gooseberries	1		
Huckleberries	1		
Loganberries	1		
Raspberries	1		
Cattle, fat	1	1[6]	

Commodity	Established Tolerance (ppm)[1]	Reassessed Tolerance (ppm)[2]	Comment *Correct Commodity Definition*
Cattle, meat	1	1[6]	
Cattle, meat byproducts	1	1[6]	
Citrus fruits	1	1/(TBD[3, 6])	[*Fruit, citrus, group*]
Citrus pulp, dried	4	4/(TBD)	[*Citrus, dried pulp*]
Clover, forage	2	0.10	These tolerances should be reclassified under 180.106(c), as use of diuron on clover is restricted to western OR. The available data indicate that the tolerance should be reduced to 0.10 ppm for clover, forage and to 1 ppm for clover, hay.
Clover, hay	2	1	
Corn in grain or ear form (including sweet corn, field corn, popcorn)	1	0.10	Concomitant with the reassignment of this tolerance, a separate tolerance should be established for [*Corn, field, grain*]. The available data indicate that the tolerance should be reduced to 0.10 ppm.
	1	0.10	Concomitant with the reassignment of this tolerance, a separate tolerance should be established for [*Corn, pop, grain*]. The available data indicate that the tolerance should be reduced to 0.10 ppm.
	1	0.10	Concomitant with the reassignment of this tolerance, a separate tolerance should be established for [*Corn, sweet, grain*]. The available data indicate that the tolerance should be reduced to 0.10 ppm.
	1	0.10	Concomitant with the reassignment of this tolerance, a separate tolerance should be established for [*Corn, field, ear*]. The available data indicate that the tolerance should be reduced to 0.10 ppm.
	1	0.10	Concomitant with the reassignment of this tolerance, a separate tolerance should be established for [*Corn, pop ear*]. The available data indicate that the tolerance should be reduced to 0.10 ppm.

Commodity	Established Tolerance (ppm)[1]	Reassessed Tolerance (ppm)[2]	Comment *Correct Commodity Definition*
	1	0.10	Concomitant with the reassignment of this tolerance, a separate tolerance should be established for [*Corn, sweet ear*]. The available data indicate that the tolerance should be reduced to 0.10 ppm.

Commodity	Established Tolerance (ppm)[1]	Reassessed Tolerance (ppm)[2]	Comment *Correct Commodity Definition*
Corn, sweet, fodder	2	Revoke	There are no registered uses of diuron on sweet corn.
Corn, sweet, forage	2		
Corn, field fodder	2	2/(TBD)	This tolerance was inadvertently omitted from the 1/14/98 Final Rule technical amendment consolidating 40 CFR parts 185-186 to 40 CFR part 180. This action will reinstate this tolerance to 40 CFR part 180.106. [*Corn, field, stover*]
Corn, pop, fodder	2	2/(TBD)	This tolerance was inadvertently omitted from the 1/14/98 Final Rule technical amendment consolidating 40 CFR parts 185-186 to 40 CFR part 180. This action will reinstate this tolerance to 40 CFR part 180.106. [*Corn, pop, stover*]
Corn, field forage	2	2/(TBD)	This tolerance was inadvertently omitted from the 1/14/98 Final Rule technical amendment consolidating 40 CFR parts 185-186 to 40 CFR part 180. This action will reinstate this tolerance to 40 CFR part 180.106. [*Corn, field, forage*]
Corn, pop, forage	2	2/(TBD)	This tolerance was inadvertently omitted from the 1/14/98 Final Rule technical amendment consolidating 40 CFR parts 185-186 to 40 CFR part 180. This action will reinstate this tolerance to 40 CFR part 180.106. [*Corn, pop, forage*]
Cottonseed	1	0.20	The available data indicate that the tolerance should be reduced to 0.20 ppm. [*Cotton, undelinted seed*]
Goats, fat	1	1[6]	[*Goat, fat]*
Goats, meat	1	1[6]	[*Goat, meat*]
Goats, meat byproducts	1	1[6]	[*Goat, meat byproducts*]
Grapes	1	0.05	The available data indicate that the tolerance should be reduced to 0.05 ppm. [*Grape*]
Grass crops (other than Bermuda grass)	2	2/(TBD)	[*Grass, forage, except Bermuda grass*]
Grass, hay (other than Bermuda grass hay)	2	2/(TBD)	[*Grass, hay, except Bermuda grass*]
Hogs, fat	1	1[6]	[*Hog, fat]*

Commodity	**Established Tolerance (ppm)[1]**	**Reassessed Tolerance (ppm)[2]**	**Comment** ***Correct Commodity Definition***
Hogs, meat	1	1[6]	[*Hog, meat*]
Hogs, meat byproducts	1	1[6]	[*Hog, meat byproducts*]
Horses, fat	1	1[6]	[*Horse, fat]*
Horses, meat	1	1[6]	[*Horse, meat*]
Horses, meat byproducts	1	1[6]	[*Horse, meat byproducts*]
Nuts	0.1	0.1/(TBD)	Concomitant with the reassignment of this tolerance, separate a separate tolerance should be established for [*Filbert*].
		0.05	Concomitant with the reassignment of this tolerance, separate a separate tolerance should be established for [Nut, *macadamia*]. The available data indicate that the tolerance should be reduced to 0.05 ppm.
		0.05	Concomitant with the reassignment of this tolerance, separate a separate tolerance should be established for [*Pecan*]**.** The available data indicate that the tolerance should be reduced to 0.05 ppm.
		0.05	Concomitant with the reassignment of this tolerance, separate a separate tolerance should be established for *[Walnut*]. The available data indicate that the tolerance should be reduced to 0.05 ppm.
Oats, forage	2	2/(TBD)	These tolerances should be reclassified under 180.106(c), as use of diuron on oats is restricted to ID, OR, and WA. The available data indicate that the tolerance should be reduced to 0.10 ppm for oats, grain; and to 1.5 ppm for oats, straw.
Oats, grain	1	0.10	
Oats, hay	2	2/(TBD)	
Oats, straw	2	1.5	
Olives	1	1/(TBD)	[*Olive*]
Papayas	0.5	0.50	[*Papayas*]
Peaches	0.1	0.10	[*Peach]*
Pears	1	1/(TBD)	[*Pear*]
Peas	1	0.10	The available data indicate that the tolerance should be reduced to 0.10 ppm. [*Pea, field, seed*]

Commodity	Established Tolerance (ppm)[1]	Reassessed Tolerance (ppm)[2]	Comment *Correct Commodity Definition*
Peas, forage	2	2/(TBD)	[*Pea, field, vines]*
Peas, hay	2	2/(TBD)	[*Pea, field, hay*]
Peppermint, hay	2	1.5	The available data indicate that the tolerance should be reduced to 1.5 ppm. [*Peppermint, tops*]
Pineapple	1	0.10	The available data indicate that the tolerance should be reduced to 0.10 ppm.
Potatoes	1	Revoke	There are no registered uses of diuron on potatoes.
Rye, forage	2	Revoke	There are no registered uses of diuron on rye.
Rye, grain	1		
Rye, hay	2		
Rye, straw	2		
Sheep, fat	1	1[6]	
Sheep, meat	1	1[6]	
Sheep, meat byproducts	1	1[6]	
Sorghum, fodder	2	2/(TBD)	[*Sorghum, grain, stover*]
Sorghum, forage	2	2/(TBD)	[*Sorghum, grain, forage*]
Sorghum, grain	1	0.50	The available data indicate that the tolerance should be reduced to 0.50 ppm. [*Sorghum, grain, grain*]
Sugarcane	1	0.20	The available data indicate that the tolerance should be reduced to 0.20 ppm.
Vetch, forage	2	0.10	These tolerances should be reclassified under 180.106(c), as use of diuron on vetch is restricted to ID, OR, and WA. The available data indicate that these tolerances should be reduced to 0.10 ppm for vetch, forage and to 1.5 ppm for vetch, hay.
Vetch, hay	2	1.5	
Vetch, seed	1	Revoke	No longer considered a significant livestock feed item.
Wheat, forage	2	2/(TBD)	
Wheat, grain	1	0.50	The available data indicate that the tolerance should be reduced to 0.50 ppm.
Wheat, hay	2	2/(TBD)	

Commodity	**Established Tolerance (ppm)[1]**	**Reassessed Tolerance (ppm)[2]**	**Comment** ***Correct Commodity Definition***
Wheat, straw	2	1.5	The available data indicate that the tolerance should be reduced to 1.5 ppm.

Commodity	Established Tolerance (ppm)[1]	Reassessed Tolerance (ppm)[2]	Comment *Correct Commodity Definition*
Tolerance Listed Under 40 CFR §180.106(b)			
Catfish fillets	2.0[4]	2.0	Expiration date of 06/30/03 [*Catfish*]
Tolerances To Be Proposed Under 40 CFR §180.106(a)			
Aspirated grain fractions	N/A	5.0	
Barley, bran	N/A	0.7	
Citrus, oil	N/A	TBD	
Cotton, gin byproducts	N/A	TBD	
Eggs	N/A	TBD	
Grass, seed screenings	N/A	TBD	
Grass, straw	N/A	TBD	
Milk	N/A	TBD	
Pineapple, process residue	N/A	0.40	
Poultry, meat byproducts	N/A	TBD	
Prickly pear	N/A	0.05	
Spearmint	N/A	1.5	
Sugarcane, molasses	N/A	0.70	
Wheat, bran	N/A	0.70	

1. Expressed as diuron *per se*, unless otherwise stated.

2. To be expressed as the combined residues of diuron and its metabolites convertible to 3,4-DCA, expressed as diuron. The residues of 3,4-DCA are low but diuron residues are converted to 3,4-DCA for the tolerance expression based on the assumption that the metabolites would not be any more toxic than diuron and the consideration that the analytical methods used to collect the field trial data are not capable of measuring each metabolite individually. The reassessed tolerances are contingent upon the recommended label revisions outlined in Table B of the *Residue Chemistry Chapter For The Diuron Reregistration Eligibility Decision (RED) Document*, dated 7/29/2001.

3. TBD = To be determined. These commodities were included in the dietary risk assessment using the *Current Tolerance* level. Additional confirmatory field trial residue data are required; therefore, the final tolerance may be revised.

4. Expressed as combined residues of diuron and its metabolites convertible to 3,4-DCA.

5. Feeding study data have been submitted to reassess the established tolerances for the fat, meat, and meat byproducts of cattle, goats, hogs, horses, and sheep. Residue data are not available for several potential feed items. If the maximum dietary burden does not increase when recalculated from all potential feed items after acceptable field trial data are submitted then the established tolerances for residues in fat, meat, and meat byproducts of cattle, goats, hogs, horses, and sheep can be lowered.

6. Residue data to support the 9.6 lbs ai/A per year rate for citrus are required. The registrant may provide data to support this use rate or change the labels to reflect the use rate of 6.4 lbs ai/A per year, as supported by current residue data.

No maximum residue limits (MRLs) for diuron have been established by Codex for any agricultural commodity.

Summary of Pending Data

The following additional confirmatory data have been identified.

Toxicology Data:

- 28-day inhalation study

Product and Residue Chemistry Data:

- New confidential statements of formula reflecting preliminary analyses of current products together with discussions of formation of impurities
- UV/Visible absorption data/spectra
- Independent lab validation for analytical method
- Multiresidue methods for diuron and metabolites in plants and livestock
- Magnitude of residue field trial data for: alfalfa forage; globe artichoke; barley hay; citrus (at the 9.6 lbs ai/A rate), cotton gin byproducts; field corn aspirated grain fractions, forage and stover; sweet corn, stover; sweet corn, forage; filbert; grass forage, hay, seed screenings, and straw; lemon (in review); pear; oat forage, hay; olive; field pea vines and hay; sorghum aspirated grain, fractions, stover, and forage; and wheat forage and hay
- Processing data for field corn and olives
- Metabolism study in fish

Occupational Exposure Data:

- Exposure study of mixing/loading/applying wettable powder or dry flowable with backpack sprayer
- Exposure study of mixing/loading/applying dry flowable with low-pressure handwand
- Worker exposure resulting from contact with treated soil and soil dissipation study
- Exposure study for mechanical harvesting alfalfa and asparagus

Environmental Fate and Ecological Effects Data:

- Avian reproduction study - diuron
- Freshwater aquatic invertebrate life-cycle toxicity study - diuron

- Estuarine/marine fish early life-cycle toxicity study - diuron
- Nontarget aquatic plant toxicity study - diuron
- Upgrade of leaching-adsorption-desorption study - diuron
- Hydrolysis of MCPDMU
- Aerobic Soil Metabolism of MCPDMU
- Aerobic Aquatic Metabolism of MCPDMU
- Anaerobic Aquatic Metabolism of MCPCMU
- Leaching-Adsorption-Desorption of MCPDMU
- Drinking water monitoring study on diuron and its major degradates (reserved).